PCT/GB 99/01094

09/701057

The Patent Office

05 MAY 1999

PCT

WIPO

PRIORITY DOCUMENT

The Patent Office
Cardiff Road
Newport
South Wales
NP9 1RH

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation and Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the international application filed on 13 NOVEMBER 1998 under the Patent Cooperation Treaty at the UK Receiving Office. The application was allocated the number PCT/GB98/03433.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or the inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed C C Shadbolt

Dated.28 APRIL 1999.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No. PCT/GB 98 / 03433

International Filing Date 13 NOVEMBER 1998 (13 11 98)

United Kingdom Patent Office PCT International Application

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) BEC/29431-1

Box No. I TITLE OF INVENTION

FLUID PACKAGING

Box No. II APPLICANT SPRECKELSEN McGEOUGH LIMITED

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

SPRECKELSEN McGEOUGH LIMITED
SUNDIAL HOUSE
HIGH STREET
HORSELL
WOKING
SURREY, GU21 4SU
UNITED KINGDOM

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: GB

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

VON SPRECKELSEN, HENNING.
LITTLE GAWTON
HORSELL VALE
WOKING
SURREY, GU21 4QU
UNITED KINGDOM

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: DE

State *(that is, country)* of residence: GB

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

COOKSON, BARBARA ELIZABETH.
FIELD FISHER WATERHOUSE
41 VINE STREET
LONDON, EC3N 2AA
UNITED KINGDOM

Telephone No. 44 171 481 4841

Facsimile No. 44 171 488 0084

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

See Notes to the request form

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

McGEOUGH, PETER MICHAEL
23 SUMMERLANDS AVE.
ACTON
LONDON, W3 6EW
UNITED KINGDOM

This person is:

- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IE

State *(that is, country)* of residence: GB

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

---

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

---

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

---

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

PCT/GB 98 / 03433

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☒ AP **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☒ AL Albania
- ☒ AM Armenia
- ☒ AT Austria
- ☒ AU Australia
- ☒ AZ Azerbaijan
- ☒ BA Bosnia and Herzegovina
- ☒ BB Barbados
- ☒ BG Bulgaria
- ☒ BR Brazil
- ☒ BY Belarus
- ☒ CA Canada
- ☒ CH and LI Switzerland and Liechtenstein
- ☒ CN China
- ☒ CU Cuba
- ☒ CZ Czech Republic
- ☒ DE Germany
- ☒ DK Denmark
- ☒ EE Estonia
- ☒ ES Spain
- ☒ FI Finland
- ☒ GB United Kingdom
- ☒ GE Georgia
- ☒ GH Ghana
- ☒ GM Gambia
- ☒ ~~GW Guinea-Bissau~~
- ☒ HR Croatia
- ☒ HU Hungary
- ☒ ID Indonesia
- ☒ IL Israel
- ☒ IS Iceland
- ☒ JP Japan
- ☒ KE Kenya
- ☒ KG Kyrgyzstan
- ☒ KP Democratic People's Republic of Korea
- ☒ KR Republic of Korea
- ☒ KZ Kazakhstan
- ☒ LC Saint Lucia
- ☒ LK Sri Lanka
- ☒ LR Liberia
- ☒ LS Lesotho
- ☒ LT Lithuania
- ☒ LU Luxembourg
- ☒ LV Latvia
- ☒ MD Republic of Moldova
- ☒ MG Madagascar
- ☒ MK The former Yugoslav Republic of Macedonia
- ☒ MN Mongolia
- ☒ MW Malawi
- ☒ MX Mexico
- ☒ NO Norway
- ☒ NZ New Zealand
- ☒ PL Poland
- ☒ PT Portugal
- ☒ RO Romania
- ☒ RU Russian Federation
- ☒ SD Sudan
- ☒ SE Sweden
- ☒ SG Singapore
- ☒ SI Slovenia
- ☒ SK Slovakia
- ☒ SL Sierra Leone
- ☒ TJ Tajikistan
- ☒ TM Turkmenistan
- ☒ TR Turkey
- ☒ TT Trinidad and Tobago
- ☒ UA Ukraine
- ☒ UG Uganda
- ☒ US United States of America
- ☒ UZ Uzbekistan
- ☒ VN Viet Nam
- ☒ YU Yugoslavia
- ☒ ZW Zimbabwe

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

PCT/GB 98 / 03433

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) 26/05/98 26 MAY 1998	9811308.7	GB ✓		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): (1)

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)*: ISA / EPO

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority)*: Date *(day/month/year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	4 ✓
description (excluding sequence listing part)	:	18 ✓
claims	:	3 ✓
abstract	:	1 ✓
drawings	:	4 ✓
sequence listing part of description	:	-
Total number of sheets	:	30 ✓

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other *(specify)*:

Figure of the drawings which should accompany the abstract: 5

Language of filing of the international application: GB

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

BARBARA E. COOKSON.
APPLICANT'S REPRESENTATIVE

Barbara E Cookson

For receiving Office use only

1. Date of actual receipt of the purported international application: 13 NOVEMBER 1998 13 11 98
2. Drawings: ☑ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA /
6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

FLUID PACKAGING

The present invention relates to fluid packaging and, more particularly, to blow moulded plastics bottles for fluids such as milk, which require to be filled and closed in a resealable manner.

In the specification which follows problems of packaging milk are specifically addressed. However, it will be appreciated that other pourable fluids such as fruit juices present similar packaging problems. The present invention is, however, only concerned with fluids which are not required to be packed in a gas-tight manner. Accordingly, the problems of packaging carbonated drinks are not addressed. The present invention is also specifically concerned with types of packaging where the weight of the container is an issue and therefore relates specifically to thin-walled blow moulded bottles.

The Technical Background

Conventionally, milk has been packaged in cardboard, gable top packs which are notoriously difficult to open and result in numerous consumer complaints about milk spillage and difficulty in pouring. The fibre carton was only suitable for packaging liquids up to a capacity of 1.5 litres.

In order to resolve these problems blow moulded plastics polyethylene bottles have been used. These bottles are provided with resealable caps. The resealable caps are normally injection moulded items. Since weight is significant in the packaging of fluids such as milk, these caps must also be light in weight. A weight of 2 to 3 g is usually the maximum that can be tolerated.

unscrews the cap the neck of the bottle is still sealed by the foil. This foil seal is pulled off in a separate operation. Severing the seal results in small hairs being raised on the plastics surface of the bottle neck. The setting of parameters for the bonding process using an induction heat seal closure is critical in order to achieve a bond which is weak enough to allow the consumer to be able to peel away the foil, yet strong enough to maintain a good primary seal with the container neck. Because the presence of the foil means that no plug can be provided the susceptibility to leakage in the consumer's home is increased as the resealing of the cap is poor. The cap is also relatively expensive as the provision of the foil insert can add as much as 20% to the cost.

Another set of problems arises from the production line process of filling the bottles and sealing them. Since the maximum linear speed of milk is restricted by the speed at which the milk starts to froth, the rate of filling depends upon the size of the nozzle used to pour the milk into the bottles. The nozzle size is constrained by the dimensions of the neck. For a typical milk container this is 38mm. Larger necks allow for quicker filling but present greater sealing problems and require larger caps.

In the present context the term blow moulding refers to extrusion blow moulding rather than injection stretch blow moulding. In many modern production lines, a blow moulding plant is adjacent the dairy. This allows the bottles to be formed, filled and sealed in a single continuous production process. The most complex stage in blow moulding is balancing each parison and controlling the material distribution. The parison is then inflated

impossible to mould without significant ovality and imperfections in the bore.

The above processes described relate to moulding machinery manufactured by companies such as Uniloy, Techne and Bekum, for example.

An alternative type of machine made by Graham Engineering and Uniloy, which is particularly suitable for on-site blow moulding plants, uses a process which is commonly referred to as wheel blow moulding. Unlike the previous processes described, the wheel produces only one parison at a time extruded from a single die-head. The mould blocks are mounted on a rotary wheel structure and pass over the parison closing as the wheel rotates. A needle assembly pierces the parison and inflates the plastic until it solidifies against the wall of the temperature regulated moulds. Wheel blow moulding gives a high level of control in material distribution in containers produced in this way. The set up time for such a machine is significantly reduced as only one die-head needs to be set up.

Where the inner wall of the neck provides one part of a seal, it may be necessary to provide a separate finishing station where the neck is either reamed or punch finished. The finishing step may produce swarf which results in the risk that the swarf could enter inside the bottles and make them unsuitable for immediate filling.

For products such as milk where large quantities are required to be distributed through the retail chain, it is highly desirable to minimise the weight of the packaging. This has resulted in larger containers and thinner walls. Typical wall thicknesses for blow moulded high density polyethylene (HDPE) are 0.4 to 0.6mm. This

container body and end member are not further described. The specification is also silent as to the method of filling the resulting container. The specification particularly suggests use with a cylindrical cardboard container. Such containers would normally be filled from the base once the openable end had been completed and sealed.

US-A-24,815,618 (Gach) shows a tamper indicating closure for a bottle designed for dry contents. A base section has a skirt which engages with the neck of the bottle and defines a spout. A foil is interposed between the neck of the bottle and an adjacent surface of an upper part of the base. A pull ring is attached to a disc which is connected to the opening in the upper part of the base by means of breakable webs. The disc is bonded to the foil. The closure is opened by pulling on the pull ring which tears the foil away from the spout. In an alternative embodiment of the Gach invention the disc is not joined to the base section and the foil is provided with a circumferential score line to facilitate tearing at the edge of the inner surface of the spout. In either embodiment a clean opening is unlikely to be produced. This would not be a problem when the bottle is used for tablets or the like but a torn foil edge within the spout is unsuitable for the pouring of liquids. The material of the bottle is not disclosed.

Although these documents are referred to as the most relevant prior art they do not represent a natural starting point for those seeking to solve the technical problems described in relation to thin-walled plastics bottles, in which the teaching has hitherto been directed exclusively at integral formation of the bottle body and neck.

Preferably the bottle is a thin-walled plastics bottle comprising a blow moulded body which is fused together with the neck and cap assembly after the body has been filled with a fluid.

This solution has numerous advantages. The neck and cap will fit together in a reliable sealing manner as both components are formed by the same manufacturing technique, preferably injection moulding. The neck and cap assembly can be supplied from a separate factory which can produce them in hygienic circumstances. Any of the pre-existing cap designs can be employed.

The body to which the neck and cap assembly is fitted can have a relatively wide mouth through which it can be filled, thus increasing the filling speed.

In addition, the foil is used to seal the mouth at the same time as the neck and cap assembly is fused to the mouth in a single heat sealing operation. This results in more reliable sealing of the filled bottles avoiding any leakage during the distribution and retailing cycle.

The term thin-walled as used herein is intended to refer to wall thicknesses of 2mm or less and preferably within the range 0.1mm to 1.0 mm. A container having a wall thickness of less than 0.1mm is unlikely to have the necessary structural integrity to hold its shape when filled with fluid. For a milk container of up to 6 pints (3.41 litres) capacity a thickness of 0.4 to 0.6mm is appropriate.

Description of a Preferred Embodiment

In order that the invention may be well understood an embodiment thereof will now be described, by way of

compression when top loaded during the subsequent operations to attach a neck and cap assembly. It is also used to locate a mouth of the neck assembly when applied in the filling process.

The body 2 with its shaped mouth profile 6 is formed by the mould against which a parison of high density polyethylene or other suitable plastics is inflated in any appropriate conventional blow-moulding operation. If the blow moulding takes place on a rotary machine then nicks 14 in the flange 12 as shown in Figure 3 will be formed. These are usually removed in second stage trimming by either reaming or punching after any dome of the parison guillotined from the container to leave the open mouth 6. This invention removes the necessity for this trimming and finishing. It is not necessary to remove these or any other irregularities in the internal profile of the mouth for use in the fusing of the neck to the container profile 6.

A neck 16 is shown in the Figures 5,6,7 and 8. The neck comprises an annular side wall 18 which forms a pour spout for the container and terminates in a projecting pour lip 22 which is slightly tapered towards the pouring edge. In the illustrated embodiment the angle of the outer wall of the pour lip is 45° to the horizontal while the angle of the inner wall is at 40°. This produces exceptionally good control and allows a very thin column of liquid to be poured with control from the spout. Such a precise point cannot be blow moulded without weight or cycle time penalties or both and this therefore represents a significant improvement relative to blow moulded pour lips.

the ring cutting into the user's finger during the pulling operation.

A skirt 40 extends around the exterior of the side wall 18 and depends from the outer edge of the outer flange 26 of the base 24. The skirt 40 terminates in an inwardly projecting rib 42 in order to engage with a recess 10 of the profile 6 of the mouth of the bottle body 2.

In an alternative embodiment (not shown) the annular side wall 18 could be provided with a shoulder so that the pour spout of the neck which is closed by a cap 50 may be of smaller diameter than the mouth of the bottle body.

The design of the side wall and pour spout of the neck 16 is dependent on the type of cap which will be used to complete the neck and cap assembly. The cap 50 in the illustrated embodiment is of the valve seal type which provides a push fit. It will be appreciated that the neck can be adapted for use with screw on caps and for this purpose may have a thread or multi-start threads formed in an outer surface of the side wall 18 to engage with a screw thread formed in an inner wall of the co-operating cap.

The cap 50 is the subject of a separate UK registered design application No 2076559. Design variations may, of course, be made. The cap as shown in Figure 8 is an injection moulded component comprising a cover plate 52 with a depending inner cylindrical plug 54 which in its relaxed condition has a slight outward flare towards its lower edge so that when inserted into the neck 16 it is forced against an inner surface of the side wall 18. Outwardly of the plug 54 there is provided a peripheral depending flange 56 which forms a bead for engaging against an underside of the pour lip 22. The bead serves to retain the cap on the neck. An outer wall of the plug

employed. A thinner foil may be necessary than has been used in prior art pealable seals in order to facilitate tearing. Any layer of polymer must also be sufficiently thin so as not to inhibit the tearability of the foil. A foil of aluminium of thickness between 12 and 25 microns with polymer layers on both sides of between 15 and 30 microns or less will tear easily in use but maintain the necessary seal within the cap. Where an aluminium laminate is used small perforations may be provided in the aluminium layer to allow the polymer to pass through during the heat sealing process and thereby form a bond between the flange 12 of the bottle body and the adjacent surface of the base 24 of the neck. The foil 70 is preferably supplied already bonded to the base of the neck and cap assembly.

Both the neck and cap are preferably injection moulded plastics components. Since they are both manufactured by the same method to the same tolerances the seal between neck and cap will be good. The neck and cap assemblies may by supplied to a bottling plant ready assembled, tested and sterilised.

The details of the injection moulding process and the detailed design of the tool will not be described herein as they will be readily apparent to those skilled in the art.

Filling Process

The described bottle and neck and cap assembly may be used in various ways in bottling plants. The bottle bodies may be supplied to the plant ready formed but this results in the need to transport large volumes and it is preferable to form the bodies in a blow moulding plant adjacent the dairy so that they can be formed and filled

is applied to bond the foil to the body. To form an effective bond some pressure may be required to hold the body and neck firmly together during this step. The induction heating and bonding may alternatively be carried out at a separate station downstream of the pick and place mechanism. Suitable induction heating machines are supplied by ENERCON AHLBRANDT.

Rotation generated friction heating could also be used to fuse the body and neck and cap assembly without the presence of an intervening foil.

Opening Process

When the user receives the filled bottle, the first step is to remove the cap 50 by lifting it at one of the lobes 60 to break the seal around the pour lip and to lever the cap open. This exposes the pull ring 36. The user inserts a finger into the centre of the ring and pulls the ring upwards about an axis defined in the plane of the base 24 perpendicular to the leg 34. This rotational movement stretches the foil 70 against the longer outer face of the saw tooth profiled teeth 32. The points of the teeth tear the foil 70 as the pull ring is lifted. The tear in the foil is directed in only a counter-clockwise direction by the notch 39 in the inner annular flange 28. The lifting of the ring also causes the base 24 to break at the annular frangible portion 30. That part of the foil 70 which is fused to the flange 28 is pulled away in a spiral with the pull ring 32 attached and is discarded with it.

The fluid may then be poured out of the exposed opening over the pour lip 22. When the user wishes to re-seal the bottle the cap 50 is replaced by simply pushing the

CLAIMS

1. A bottle comprising a body (2) having an open mouth (4),
a neck and cap assembly comprising a skirt (40) adapted to engage over the mouth and defining a pour spout (16) and having a ring pull (36) coupled to a removable part (28) held within a base (24) of the neck which seats against an upper surface (12) of the mouth; and
a foil (70) interposed between the surface (12) and the base (24) and fused with both such that removal of the ring pull (36) and removable part (28) removes at least part of the foil (70)and opens the spout (16);
characterised in that the removable part is an annular flange (28) separated from a remainder of the base (24) by means of a frangible valley (30) defining a plurality of depending teeth (32) each having a saw tooth profile inclined inwardly to a centre of the base such that on removal of the ring pull the foil (70) is torn by the teeth (32).

2. A bottle as claimed in claim 1, characterised in that the ring pull is supported above the annular flange (38) by means of a leg (34) and the depth of the ring tapers away from the leg to a its narrowest part opposite the leg.

3. A bottle as claimed in claim 1, characterised in that the foil is a tearable aluminium foil coated with a fusible polymer material on both sides.

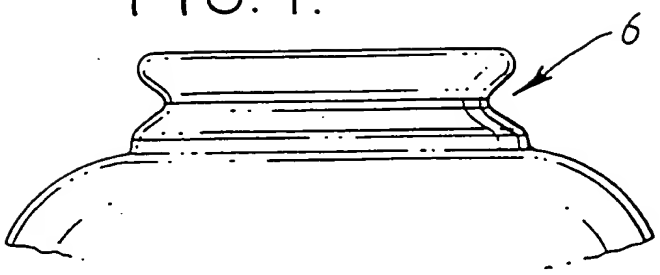
4. A bottle as claimed in claim 1, characterised in that the bottle is a thin-walled blow-moulded

11. A process as claimed in claim 10, wherein the bottle body leaving the mould is passed directly to a filling station.

12. A bottle substantially as herein described with reference to the accompanying drawings.

13. A process for bottling fluids substantially as herein described with reference to the accompanying drawings.

FIG. 1.



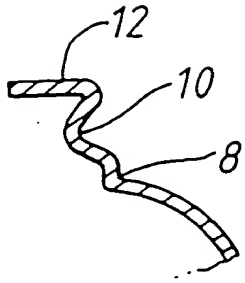


FIG. 4.

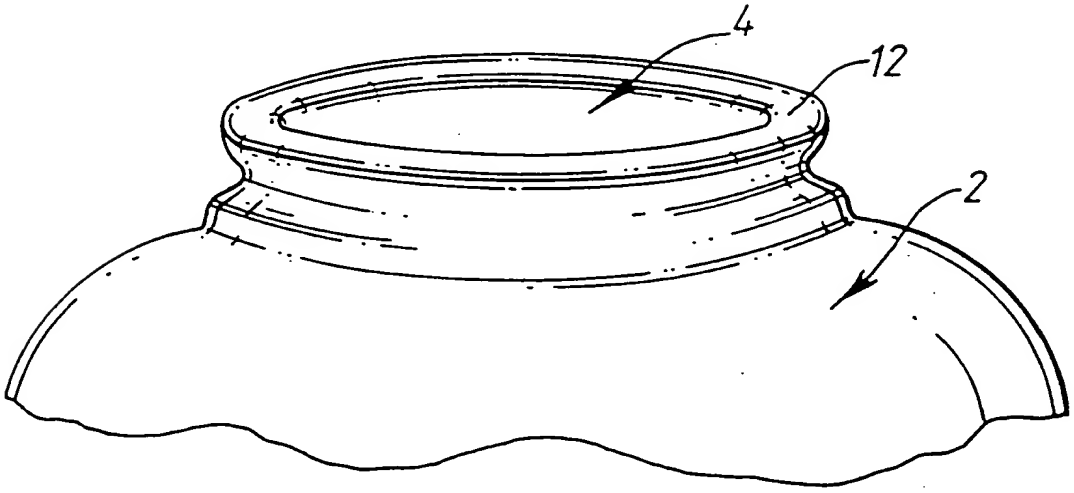


FIG. 2.

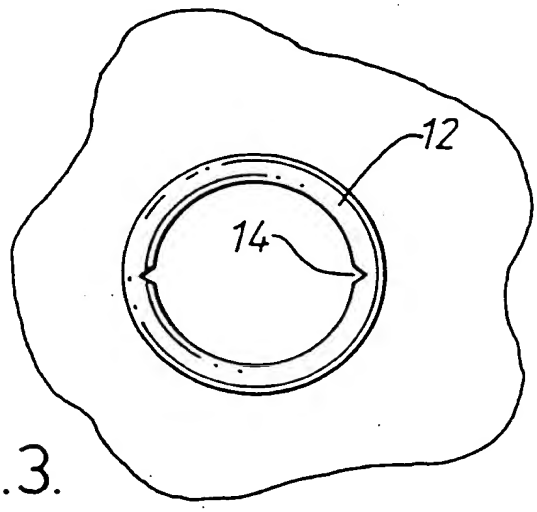


FIG. 3.

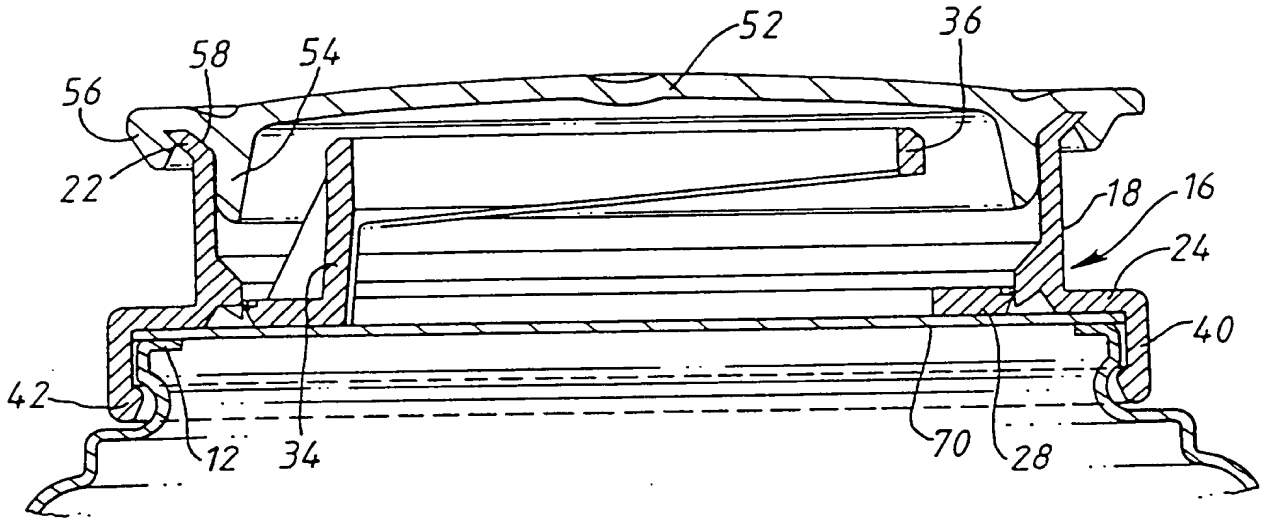


FIG. 5.

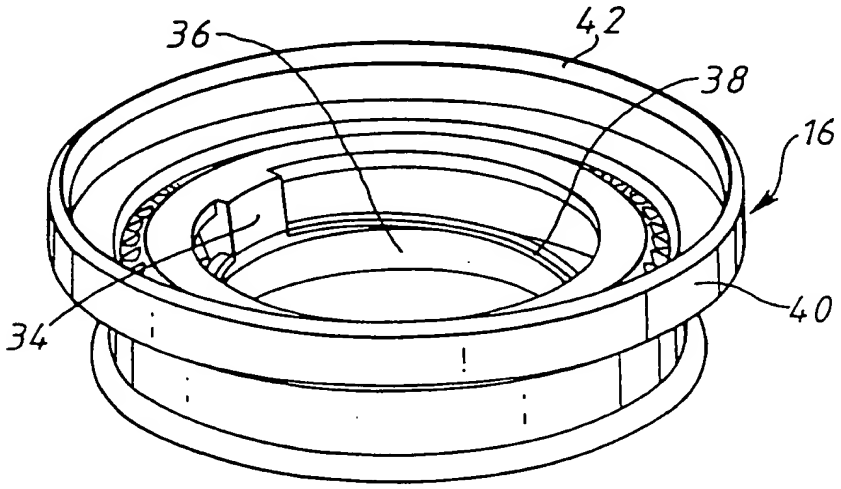


FIG. 6.

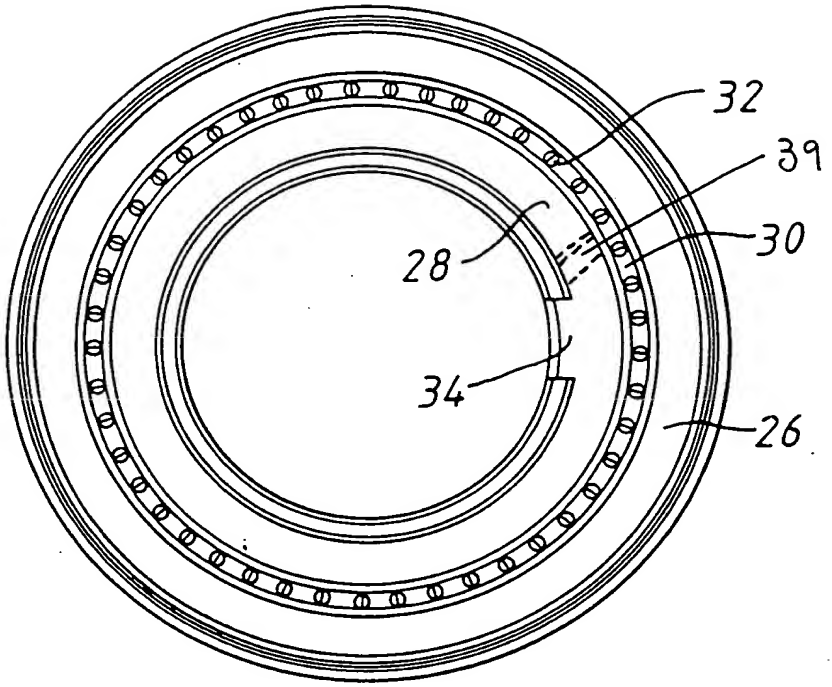


FIG. 7.

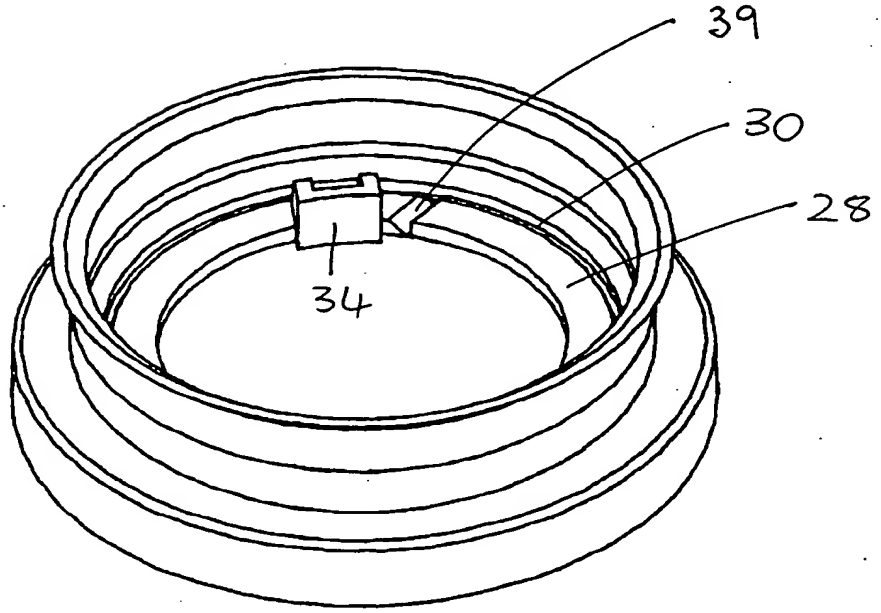


FIG. 8.

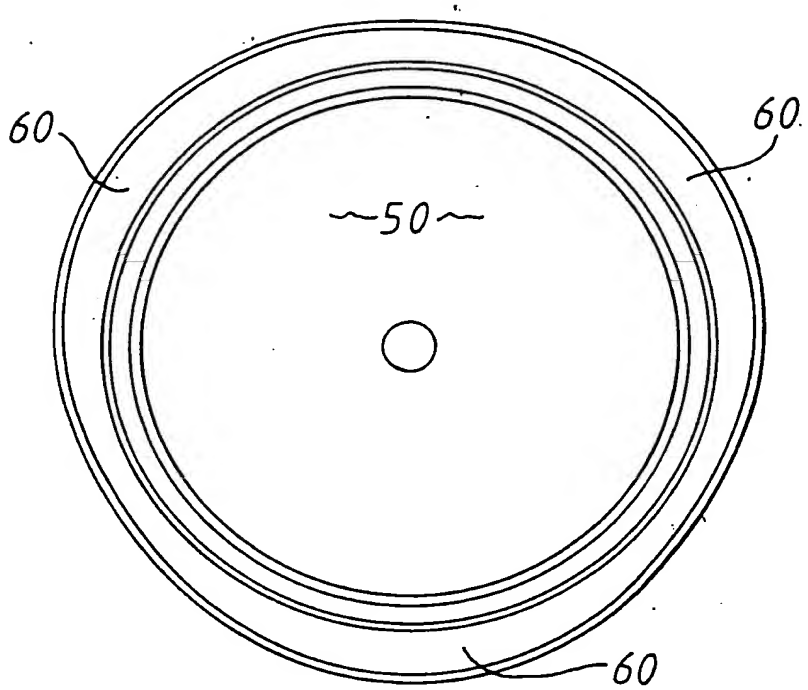


FIG. 9.